



Agricultural
Research
Service

South
Atlantic
Area

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Improving Soil Productivity with Conservation Tillage and Double Cropping: a History of the P1 Watershed

Why Does it matter?

Cropping and tillage practices from the 1800's until the mid 1900's caused severe soil degradation to much of the 40.7 million acres of the Southern Piedmont, a region that stretches from Alabama to Virginia. Soil losses of 6 to 12 inches were not uncommon for many fields and crop productivity was reduced by the decreased water and nutrient holding capacities. Improving productivity of these soils requires adoption of better management practices that protect the soil and replaces the lost organic matter that is important for availability of water and nutrients.

What was done?

A research conservation tillage cropping systems study was started in the fall of 1974 by the late **Dr. George Langdale** to evaluate impacts of conservation tillage on runoff and soil loss. The project is located on the 6.1 acre **P1 watershed** which has slopes from 2 to 10%. The soil type is a Cecil sandy loam soil common in the Southern Piedmont. The area is double cropped by **planting a winter cover crop** (clovers or small grains) with a grain drill followed by **minimum tillage or no-till planting of summer crops** (soybeans, grain sorghum, millet, cotton or corn).



What was found?

After the first 3 years, runoff decreased nearly 10 fold with less than 2% of rainfall lost to runoff annually. Soil loss declined nearly 100 fold due to the reduction in runoff volume and intensity. A **significant finding** was an **increase in soil organic matter** content of the upper soil layers after several years of continuous conservation tillage and double cropping. This increase was noted along with improvements in soil physical properties that positively influenced water infiltration. From 1972 to 2000 soil C (a key indicator of soil organic matter) in the top 6 inches increased from 0.5% to 1.1% and for the 36 inch profile increased nearly 400%. Crop yields have averaged 25 to 100% greater than regional historic averages. Dryland soybean yields in 1996 were near 55 bu acre⁻¹ which was more than double the regional average of 20 bu acre⁻¹. Dryland corn yields in 1999 and 2005 were around 140 bu acre⁻¹ which were 100% and 27% greater than regional yields for those years.

What is the impact?

The conservation tillage and cropping practices implemented on the P1 watershed have proven to be effective for reducing soil and water loss for Southern Piedmont soils and are now in use on many farms in the region restoring soil productivity. Adopting conservation tillage systems can be profitable because the number operations needed to produce a crop are reduced. It also helps protect the environment by reducing losses of nutrients and chemicals. The P1 watershed has been used by many ARS, NRCS, and UGA extension specialists to demonstrate the benefits of conservation systems. Farmers and students from the US and many other countries have been shown the results at the site. The location continues to serve both research and educational roles for ARS and other cooperators. The P1 watershed has become both a benchmark and landmark site for the restoration of soil productivity in the Southern Piedmont.

Research Team and Contact information

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